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Depressaria bayindirensis, a new species from the *hystricella/taciturna* species-group (Depressariinae, Lepidoptera) from Turkey

Peter Buchner [1] **Muhabbet Kemal** **Sibel Kızıldağ**

Abstract: *Depressaria bayindirensis*, a new species from the *hystricella/taciturna* species-group (Depressariinae, Lepidoptera) from Turkey. *Misc. Pap*. 170: 1-11, 19 figs.
The species *Depressaria bayindirensis* sp. n. is described. It is closely related to *D. taciturna* and *D. nomia*, the further related species are *D. irregularis* and *D. hystricella*.
Keywords: Lepidoptera, Depressariidae, *Depressaria*, Turkey, new species, DNA barcoding.

Introduction

Among unset moths in coll. ZMUC (Copenhagen), collected by M. Fibiger 1987 in Bayındır, Turkey, in 2017 P. Buchner found two specimens of *Depressaria* sp. with palps indicative of *D. taciturna* Meyrick, 1910 or *D. irregularis* Matsumura, 1931. However the location far outside the range of these East Palaearctic taxa (both known from Nepal eastward to Japan) was puzzling. Dissection of one male showed genitalia very close to *D. irregularis*, but with some small differences. M. Kemal found a similar specimen, a female, in Anamur, Turkey; dissection showed clear specific differences from the known species of *hystricella/taciturna*-group, but put it near *D. taciturna*. Conspecificity of the two Turkish specimens was expected, and barcodes, which turned out to be identical, confirmed this.

Methods

Morphological examination: Genitalia preparations followed standard techniques (Robinson, 1976). Male preparations were stained with mercurochrome and females with chlorazol, which brings a better result than using the same stain for both sexes. Photos and slides have been made by P. Buchner, if not specified.

Photographic documentation: Photos of whole specimens were taken with Canon EOS 5DMark III and Canon lens EF 100mm 2.8 L IS USM at 1:1. Photos of specimen details were taken with Canon lens MP-E 65 at 2:1, using ring flash. Genitalia photos were taken with microscope

[1] Mag. Peter Buchner. Scheibenstraße 335, 2625 Schwarzau am Steinfeld, Austria. e-mail: buchner.324@tele2.at
Dr Muhabbet Kemal. Van Yüzüncü Yıl University, Faculty of Science, Department of Biology, Campus, Van / Turkey. e-mail: muhabbet_kemal@yahoo.com.tr
Dr Sibel Kızıldağ. Van Yüzüncü Yıl University, Faculty of Science, Department of Biology, Campus, Van / Turkey. e-mail: sibelkizildag@yyu.edu.tr

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(Wild Heerbrugg) using a 10x objective and a 2.5x ocular. All photos were edited using the software Helicon Focus 4.80 and Adobe Photoshop 6.0.

Depressaria bayindirensis sp. n.

http://zoobank.org/urn:lsid:zoobank.org:act:32ED5B54-9534-4932-9BDD-6466E1184135

Material examined

Holotype: ♀, Turkey, İzmir Province, Bayındır, 17.vii.1987, leg. M. Fibiger, coll. ZMUC (Zoological Museum, University of Copenhagen, where it will be stored), GP DEEUR 5469 P. Buchner.

Paratypes: 1 ♀, Turkey, İçel Province, Anamur, Kaşyaylası 3km SW, 1180m, 10.ix.2017, leg. M. Kemal, coll. CESA (Centre for Entomological Studies Ankara), GP2765 M. Kemal (photos published in Kemal & Koçak, 2018); 1 ♂, Turkey, İzmir, Bayındır, 17.vii.1987, leg. M. Fibiger, coll. ZMUC, GP DEEUR 5468 P. Buchner.

Diagnosis

Wing patterns of *Depressaria bayindirensis* sp. n. correspond with many other species in genus *Depressaria*, but a feature of second segment of labial palp allows easy separation of species of *D. hystricella/taciturna*-group from the rest of the genus, as long as their scales are present: it is densely covered with broad but not very long, protruding scales. On outer and ventral sides the scales are black or at least very deep brown on basal 4/5 and whitish on upper 1/5, forming a sharp and distinct contrast (Fig. 3b).

To distinguish it from *D. irregularis, D. taciturna* and *D. nomia* Butler, 1879, dissection is needed. Female genitalia are more distinct: only *Depressaria bayindirensis* sp. n. shows a signum with incision on caudal and cranial edge. In male genitalia, the hyaline end of cuiller provides best separation; rather slender and longer than in any of the other three species. The more shallow excavation of anellus and the different shape of lateral triangular appendix of anellus are additional characters (compare Figs. 8-11).

Description

Adult (Figs. 1-3). Wingspan 23-25 mm. Head with raised yellowish brown to reddish brown scales on neck and crown, face silvery grey with light brownish tinge, becoming medium brown in lower part. Labial palp segment 2 with broad scales, protruding on ventral and adpressed on lateral and rear sides, scales black or at least very deep brown at base and whitish on upper part, forming a sharp and distinct contrast on ventral and outer sides at 4/5, whitish part more extended and not sharply contrasting with the black basal scales on inner side; segment 3 half of length of segment 2, slender with adpressed scales, a mix of brown and yellowish colours in basal 2/3, pale yellowish at the tip. Antenna dark brown. Thorax and tegulae medium brown only on frontal ¼, the rest predominantly whitish to light grey, forming a distinct contrast against the darker forewings. Forewings medium brown, with a narrow black streak at 1/6 near costa, an elongated to triangular black spot at 1/3 with paler area distal to it, and a pale round spot at 3/5, edged with blackish scales predominantly distally; the pale, angled transverse line with tip at about 4/5, a common feature in genus *Depressaria*, is present but very weak; vein-associated blackish longitudinal streaks poorly developed, only the one distal of pale central spot more prominent; interneural dots present, but confluent, forming a somewhat interrupted black line; cilia a mix of pale, brown and blackish scales, without obvious cilia line. Hindwings grey, becoming darker posteriorly, with narrow blackish line at cilia-base; cilia slightly paler than ground colour of hindwings, but with a distinct darker band at basal ¼ . Fore- and midlegs without distinct patterns, predominantly dark grey, tibia and tarsus of mid- and hindlegs with a mix of darker and pale yellowish scales.

Variation: The female from Anamur differs in much darker ground colour of forewings (Fig. 2).

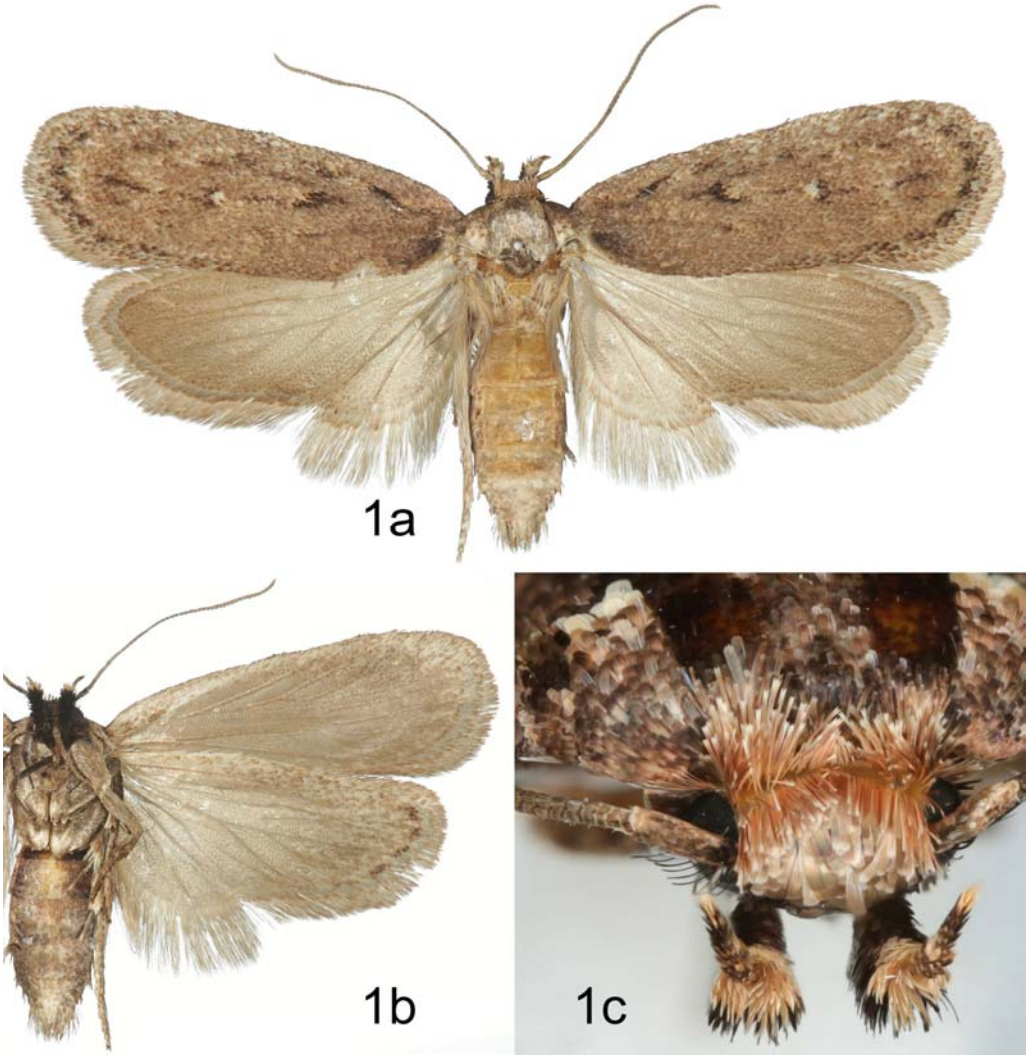


Fig. 1. Holotype, ♀**:** Turkey, Izmir, Bayındır, 17.vii.1987, leg. M. Fibiger. a: upperside, b: underside, c: head and palp

Fig. 2. Paratype, ♀**:** Turkey, İçel, Anamur, 10. ix.2017, leg. & photo M. Kemal

Fig. 3. Paratype, ♂: Turkey, İzmir, Bayındır, 17.vii.1987, leg. M. Fibiger. Upperside (3a), head with palp, outer side (3b).

Fig. 4. Habitat of the paratype of *Depressaria bayindirensis* sp. n. South Turkey, İçel Prov., Anamur, Kaşyaylası 3km SW, 1180m, 10.ix.2017, M. Kemal.

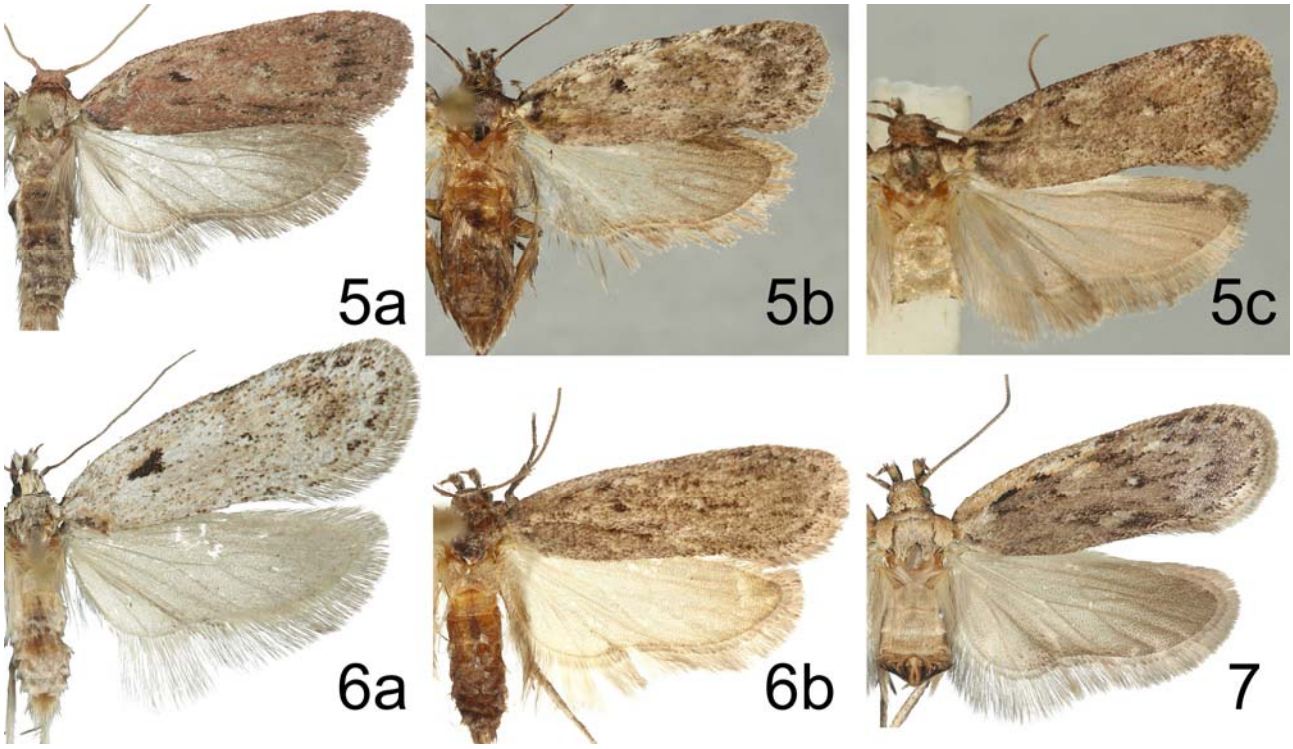


Fig. 5: *Depressaria taciturna*
Fig. 6: *D. irregularis*
Fig. 7: *D. nomia*
5a: Nepal,18. x.1995, leg. M. Fibiger, coll. ZMUC
5b: Russia, Primorskii kraj, 19.vii.1999, leg. M. Fibiger, coll. ZMUC
5c: "Himalaya", Muktesar, ix.1922, ex coll. Meyrick, coll NHM London
6a: Nepal,18.x.1995, leg. M. Fibiger, coll. ZMUC
6b: Russia, Primorskii kraj, 28.vii.1998, leg. J. Kullberg et al., coll. ZMUH (Helsinki)
7: Japan, 30.v.1979, e.l. *Quercus serrata*, leg. T. Oku, coll. ZMUC

These photos demonstrate that determination based only on external features will bring no reliable result. There are only tendencies: reddish brown ground colour indicates *D. taciturna*, silvery grey forewings indicate *D. irregularis* and yellowish colours on basal half of costa indicate *D. nomia*. In all three species indistinctive specimens (like in Figs. 5c, 6b) can also be found.

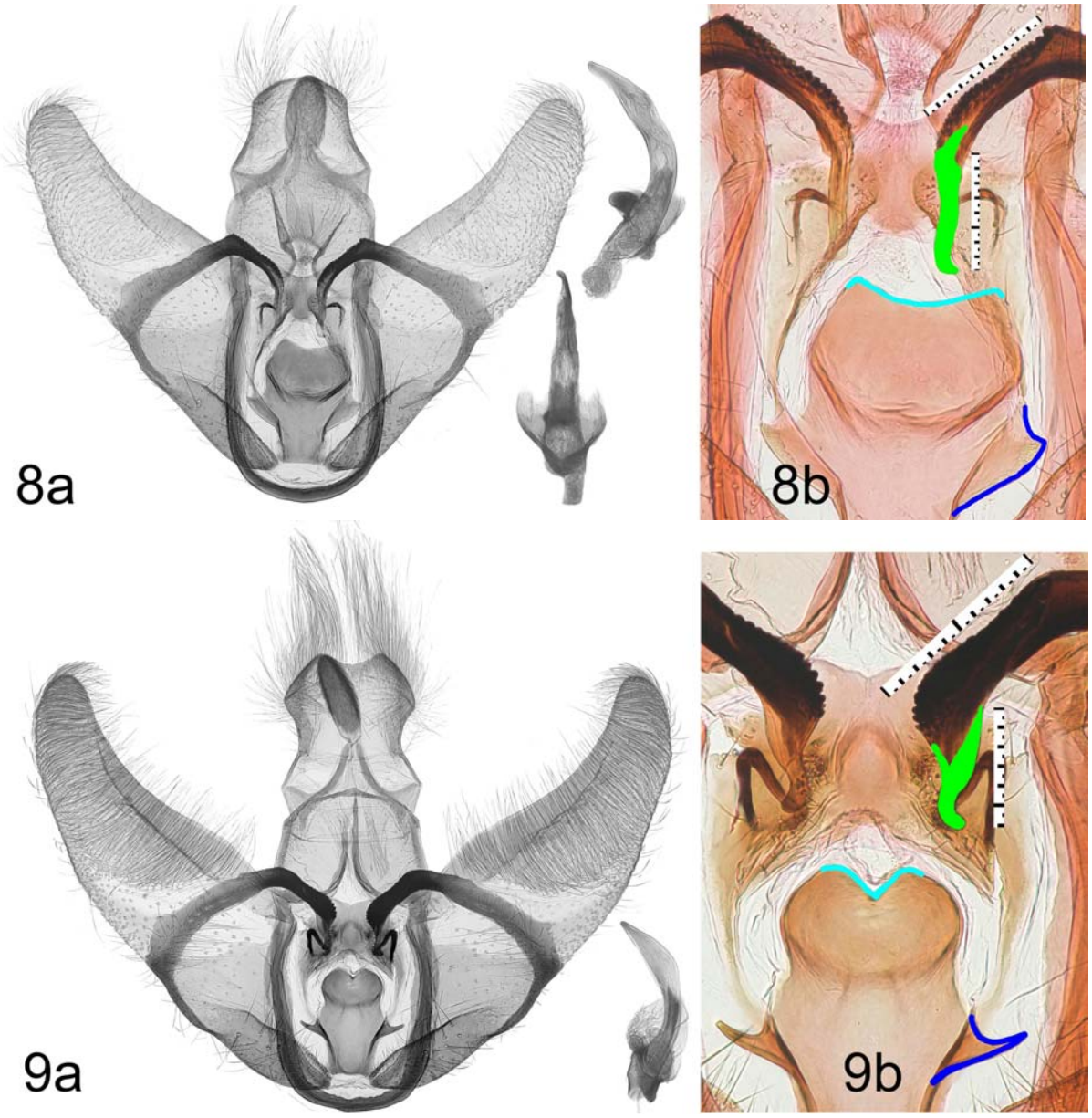
Male genitalia (Fig. 8)

With the characters of the *hystricella/taciturna* species group (to be understood only as manuscript name without associated taxonomic level, Figs. 8-12): cuiller strongly curved inward + tegumen rounded or slightly excavated, protruding uncus and socii not developed. Also with additional characters of *taciturna*-subgroup (Figs. 8-11): cuiller distinctly dark and verrucose in central part, toward tip becoming hyaline, forming a structure resembling lateral outline of a bird´s head, tips directed toward vinculum, nearly touching each other; phallus with a strongly sclerotised, funnel shaped basal process.

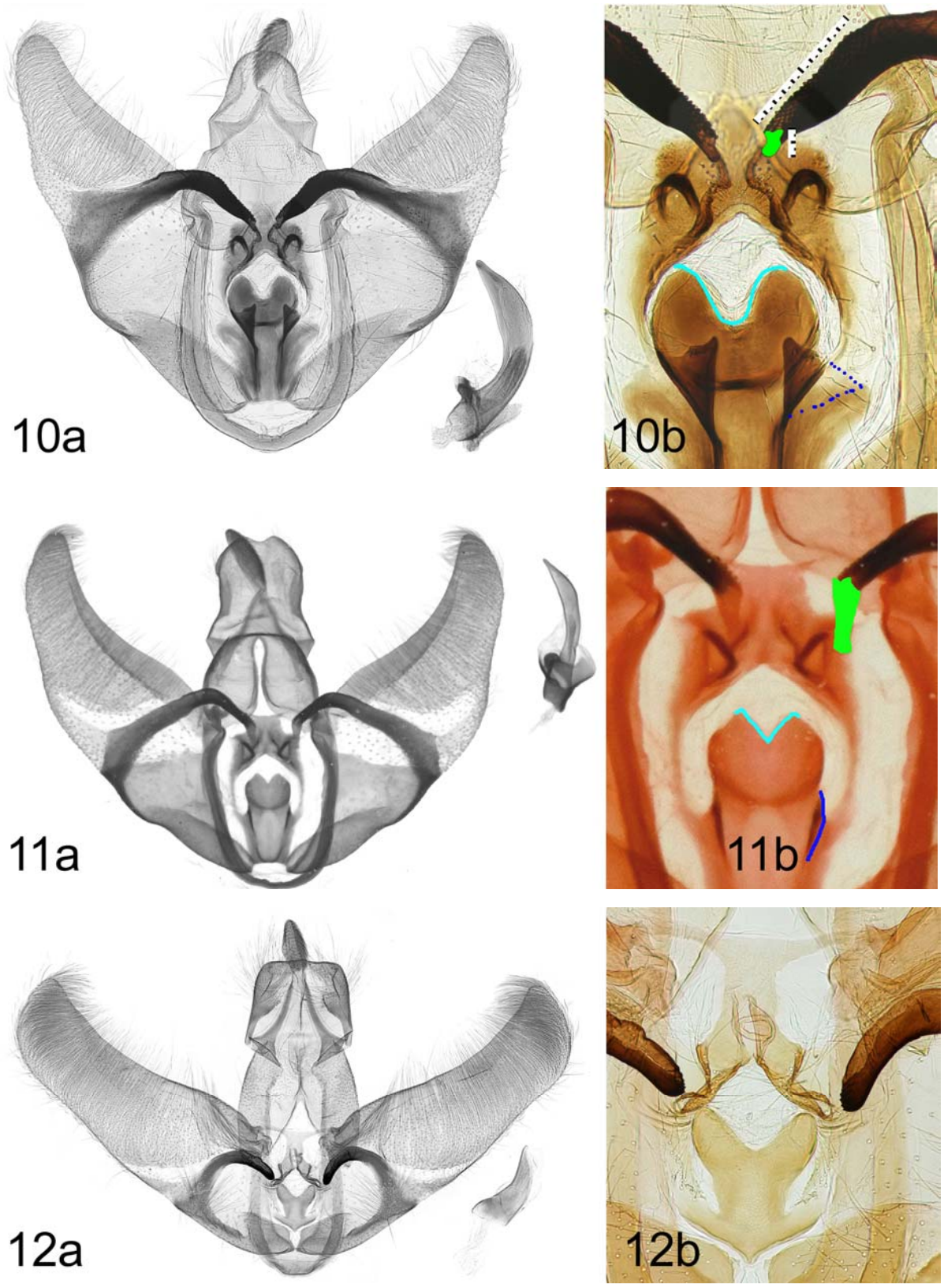
To separate the male genitalia of *taciturna*-subgroup, 3 areas had been selected and marked with colours in the figs. 8-11: green → hyaline tip of cuiller, cyan → excavation of anellus, blue → lateral appendix of anellus-base.

In *D. bayindirensis* sp. n., hyaline tip is more slender and longer (about 4/5 of the part of cuiller from strong bend to end of verrucose surface) than in the three compared species: in *D. taciturna* (Fig. 10) it is very short (about 1/5 of compared part of cuiller), in *D. irregularis* (Fig. 9) and *D. nomia* (Fig. 11) it is about 3/5 of this length, and in *D. irregularis* a further difference is its broad base. Excavation of anellus is a very shallow "U" in *D. bayindirensis* sp. n., a deep "U" in *D. taciturna,* and in *D. irregularis* and *D. nomia* it is V-shaped. Lateral appendix of anellus-base is most similar to that of *D. taciturna* (note: this structure may also turn inward during preparation,

so in the slide shown under Fig.10, this is not a different feature), in *D. irregularis* it is more sharply pointed and in *D. nomia* it is scarcely developed at all.



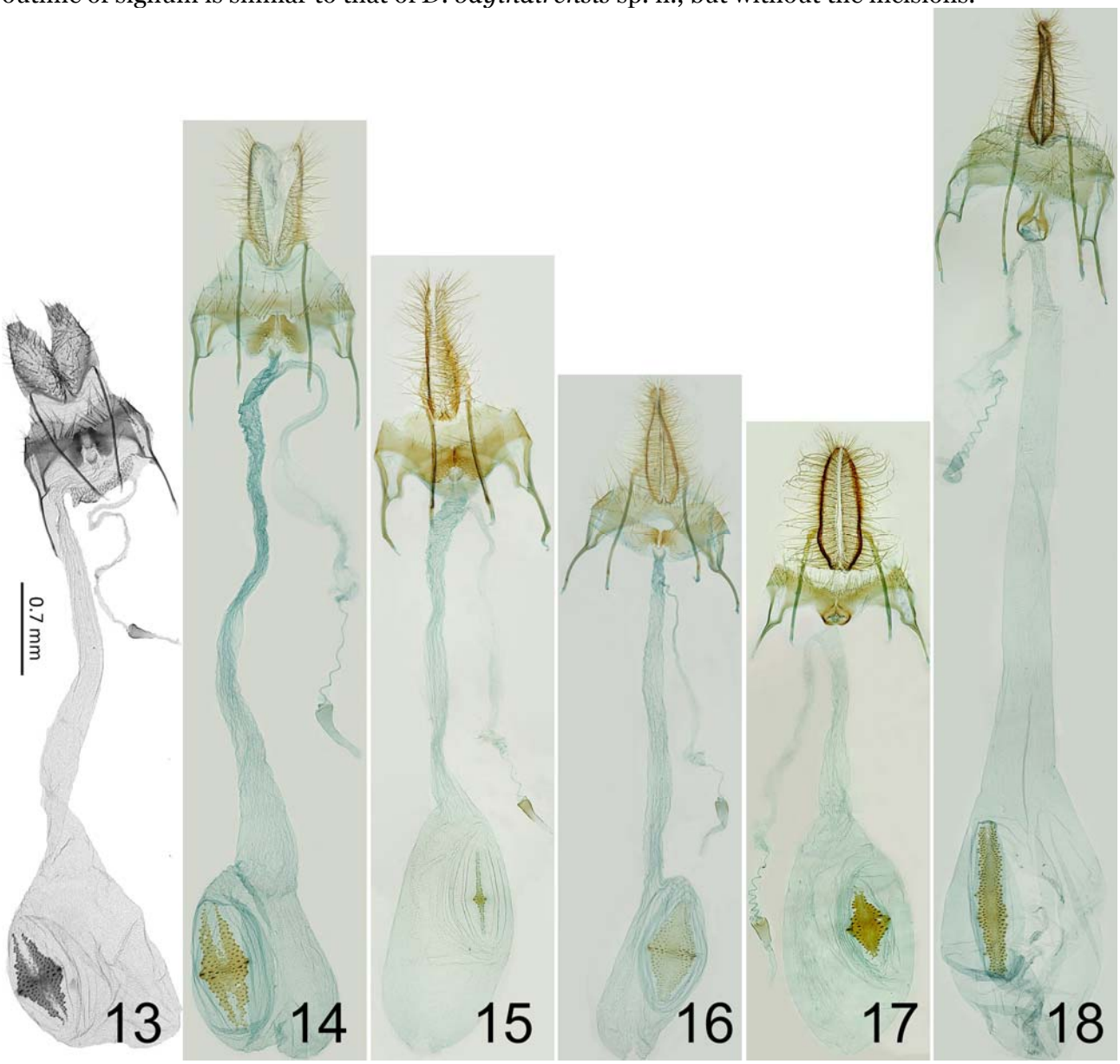
Figs. 8-11: *taciturna*-subgroup, male genitalia. For details see text (to be continued)
Figs. 8a-b: *Depressaria bayindirensis* sp. n., Turkey, Izmir, Bayındır, 17.vii.1987, leg. M. Fibiger, coll. ZMUC (Copenhagen)
Figs. 9a-b: *Depressaria irregularis*, China, Fenglin Bios Reserve, 13.v.2000, leg. J. Kullberg, coll. ZMUH (Helsinki)



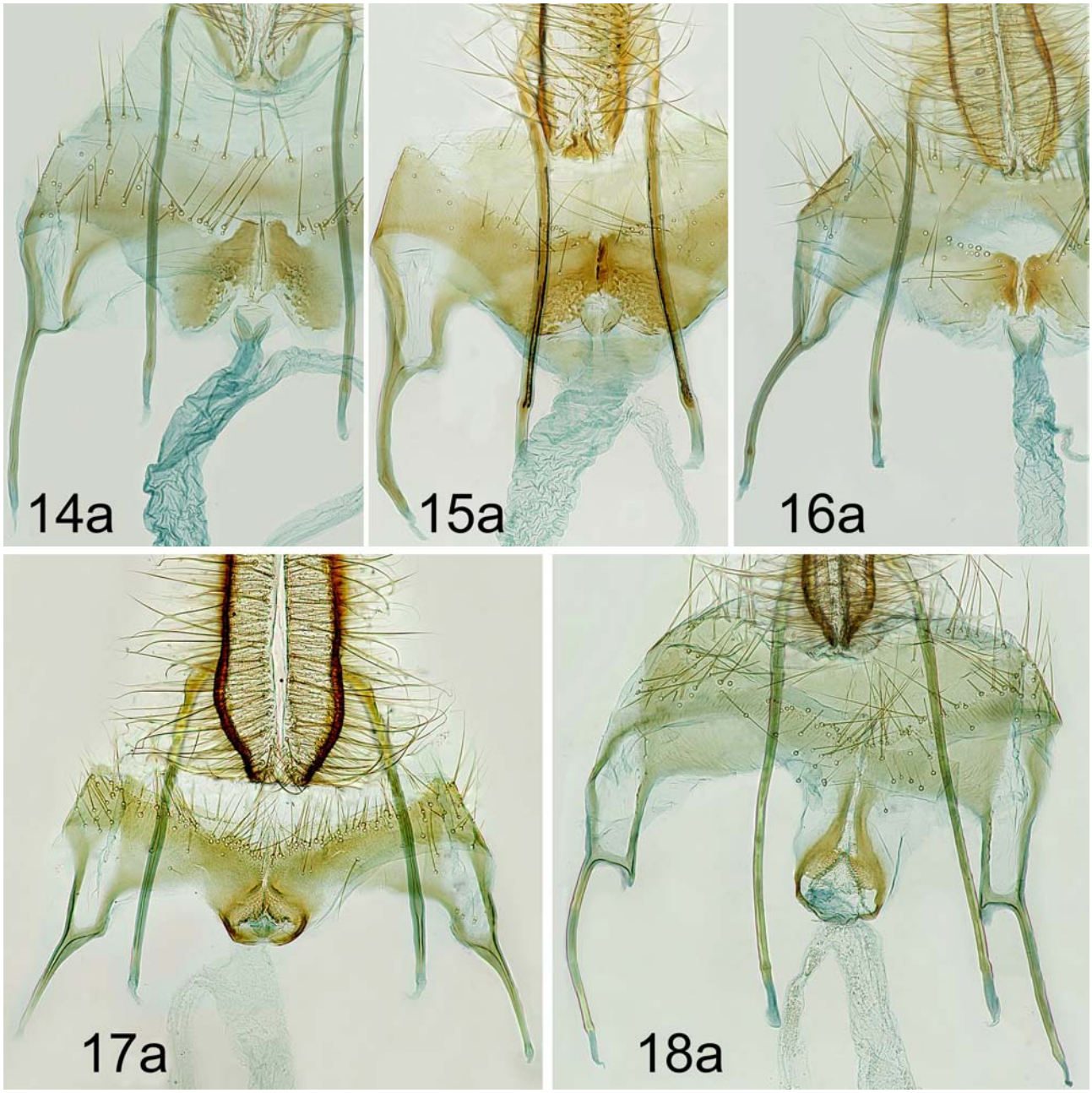
Figs. 8-11: *taciturna*-subgroup, male genitalia. For details see text (concluded)
Figs. 10a-b: *Depressaria taciturna*, Nepal,18.x.1995, leg. M. Fibiger, coll. ZMUC
Figs. 11a-b: *D. nomia*, Lectotype, Japan, Yokohama, GP 18880 K. Sattler, coll. NHM (London)
Figs. 12a-b: *D. hystricella*, Russia, Sarepta, 1866, ex coll. Staudinger, coll. NHMV (Natural History Museum, Vienna)
Technical remark, especially on fig. 10b: The slides are usually edited with stacking technique, but for the visibility of outline of hyaline tips of cuiller this may be a disadvantage, because these are placed just above similar structures, with which the tips seem to melt together. Therefore in fig. 10b, for the central part a photo had been used with focus level only on tips of cuiller, leaving the lower parts out of focus.

Female genitalia (Figs. 13-18). With the characters of the *hystricella/taciturna* species group, among them the most important is the structure of anterior apophyses: each originates from two distinct branches. A second feature which is found in this species group is the unusual configuration of sternite VIII, narrow laterally and considerably expanded in middle around the ostium, where a sclerotisation is developed which includes irregular warty structures. Details of this area are rather different within this group.

In *D. bayindirensis* sp. n. (Figs. 13-14), the sclerotised area around ostium is like the opening of a tent, with caudal edge open, and therefore most similar to that of *D. taciturna* (fig. 15). Shape of signum is very different, longitudinal: transverse diameter about 2:1, but with an incision at caudal and oral tip, which gives it an unique appearance in genus *Depressaria*. In *D. taciturna* it is very narrow, longitudinal: transverse diameter about 6:1. In *D. nomia* (fig. 16) the sclerotised area is small and restricted to an area caudal of ostium, outline of signum is similar to that of *D. irregularis* (fig 17), but teeth - except a few in the mediane - are much smaller. In *D. irregularis,* sclerotisation around ostium is extending caudally and surrounds it completely, outline of signum is similar to that of *D. bayindirensis* sp. n., but without the incisions.



Figs. 13-18: For explanations of the figures, see next page



Figs. 13-18: Female genitalia, total view. **Figs**. **14a - 18a**: Details of VIII sternite + ostium

Fig. 13: *Depressaria bayindirensis* sp. n., Turkey, İçel, Anamur, 10.ix.2017, leg. & GP 2765 & photo M. Kemal, coll. CESA
Fig. 14: *Depressaria bayindirensis* sp. n., Turkey, İzmir, Bayındır, 17.vii.1987, leg. M. Fibiger, coll. ZMUC
Fig. 15: *Depressaria taciturna*, Russia, Primorskii kraj, 19.vii.1999, leg. M. Fibiger, coll. ZMUC
Fig. 16: *Depressaria nomia*, Japan, 30.v.1979, e.l. *Quercus serrata*, leg. T. Oku, coll. MFN
Fig. 17: *Depressaria irregularis*, Nepal, 18.x.1995, leg. M. Fibiger, coll. ZMUC
Fig. 18: *Depressaria hystricella* Möschler, 1860, Russia, Cheliabinski kraj, 25.v.1998, leg. & coll. J. Junnilainen

Molecular data

Data of barcoded specimens

♂, Turkey, İzmir, Bayındır, 17.vii.1987, leg. M. Fibiger, coll. ZMUC: Barcode specimen number TLMF Lep 23186, 658 bp.[on]

♀, Turkey, İçel, Anamur, 10.ix.2017, leg. M. Kemal, coll. CESA; sequencing organised by S. Kızıldağ, 658 bp.[on].

The specimen collected in Bayındır, 17.vii.1987, was sequenced in the Canadian Centre for DNA-Barcoding, University of Guelph. Due to its age of 30 years, "degraded material protocol" was chosen, which uses primers LepF1 & MLepR2 and MLepF1 & LepR1 for two short reads covering the barcode-region. From the specimen collected in Anamur, DNA was extracted and amplified using LepF1 & LepR1-primers in Van Yüzüncü Yıl University, Turkey. The PCR products were sent to Macrogen (Netherlands) for sequencing.

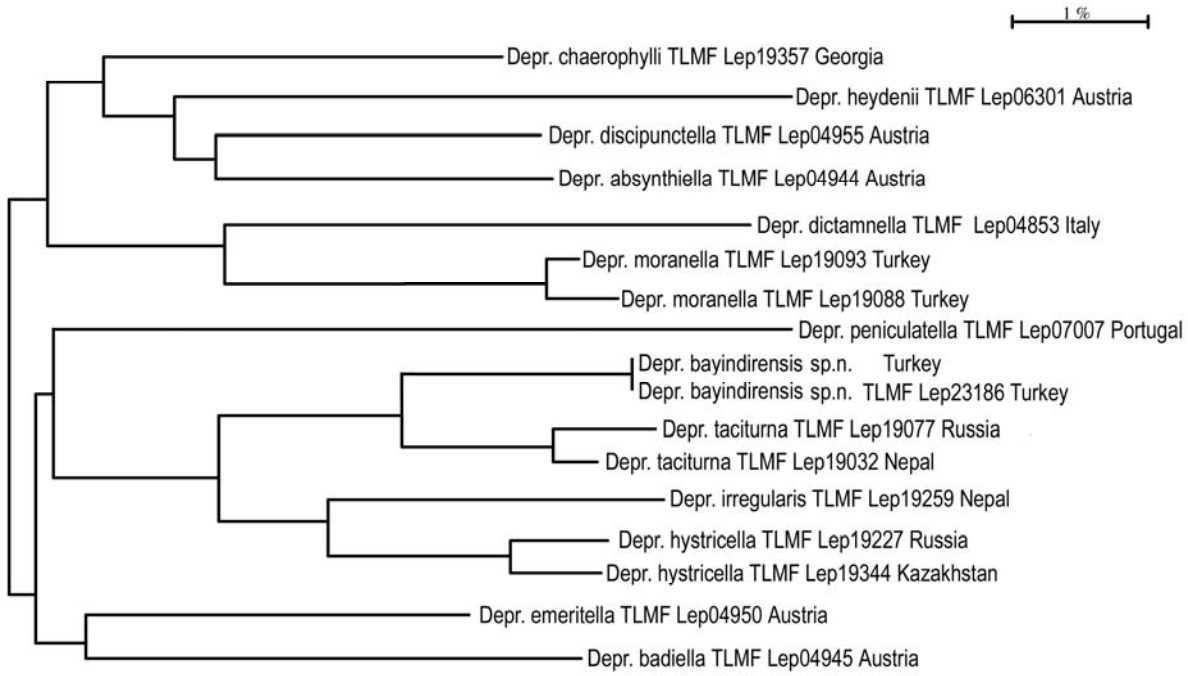


Fig. 19. Neighbour-joining tree of *Depressaria bayindirensis* sp. n. and related species. –
Beside the species from *hystricella/taciturna* group and the *moranella/dictamnella* group (reason for this see under "related species), also several *Depressaria* - species have been included which are obviously not close relatives.
Associated BOLD BINs (Barcode Index Numbers): *D. bayindirensis* sp. n.: not yet available. *D. taciturna*: BOLD:ACN1500 *D. irregularis*: BOLD:ADF0288 *D. hystricella*: BOLD:ADC1128 *D. moranella* Chrétien, 1907: BOLD:ACZ2669 *D. dictamnella* (Treitschke, 1835): BOLD:AAI8364
Barcode data are accessible via the public dataset DS-DEEUR337 (also BOLD BIN of *D. bayindirensis* sp.n., as soon as it is available)

Neighbour-joining analysis shows *D. taciturna* as the nearest neighbour with 3.06% p-distance. In genus *Depressaria*, the second nearest neighbour is *D. hystricella* with 5.05% p-distance, and p-distance to *D. irregularis* is 6.52%. But in p-distances between 4.5 and 5.5, also species of obviously distant families (e.g. Gelechiidae, Erebidae, Geometridae) are found, therefore in p-distances of more than 4%, grouping into clusters in neighbour-joining tree brings better information than numeric distance: The species of *hystricella-taciturna*-group are found in one cluster, *D. moranella* and *D. dictamnella* also in one, but separate cluster.

Etymology

The species name is derived from Bayındır (İzmir, Turkey), the area where the holotype and one paratype had been collected.

Distribution

So far known from Turkey.

Related species

Based on genitalia, *Depressaria bayindirensis* sp. n. belongs to a species group with *D. taciturna, irregularis, nomia* and *hystricella*. Within this group, male genitalia excluded *D. hystricella* and female genitalia also *D. irregularis* as closest species. In the remaining species, female genitalia are most similar to those of *D. taciturna*, a position which is also supported by barcode. Female genitalia of *D. nomia* show the same basic pattern, but no barcode of this species

is available, so the answer which of the two latter species is closer to *Depressaria bayindirensis* sp.n. must remain open.

Remark on the combination *Agonopterix taciturna* (Meyrick, 1910), introduced by Clarke: Already Hannemann realised, this must be a misplacement, supported by wing venation and genitalia: "Diese Art hat Clarke (1963) bei der Revision der Meyrick-Typen untersucht ...und irrtümlich in die Gattung *Agonopterix* verwiesen" [Clarke studied this species during the revision of the Meyrick types and transferred it to the genus *Agonopterix* by error] (Hannemann, 1983)

Remark on Hannemann´s genus (now subgenus) "*Horridopalpus*" with the species *moranella*, *dictamnella* and *hystricella* (Hannemann 1953): In fact, the first 2 species are closely related and differ (for example in structure of palps) from other species of the genus. But *D. hystricella* is clearly misplaced here. Obviously, Hannemann followed the original description (Möschler, 1860: "In Gestalt und Größe der *D. dictamnella* am nächsten stehend" [closest to *D. dictamnella* in shape and size]). But Möschler had not said, they are relatives. Therefore Hannemann´s placement is difficult to understand, because *D. hystricella* has not even one feature which could support this idea, and also biology is different: *D. moranella* and *D. dictamnella* feed on Rutaceae, a plant family close to Apiaceae, while *D. hystricella* feeds on *Spiraea*, Rosaceae (Patočka, 1988).

Bionomics

Moths had been found middle of July and September, so far no conclusion on the stage of hibernation is possible. Host-plant is unknown, but it is likely to be a *Quercus sp*., because this is host-plant of *D. taciturna* (Lvovsky, 2004: *Qu. mongolica* Fisch. ex Turcz., *Qu. crispula* Blume), *D. irregularis* (Lvovsky, 2001: *Quercus mongolica)* and *D. nomia* (label-data: "larva on lvs of *Quercus serrata* Thunb. coll. on 30.v.1979 by T. Oku, Japan, Honsyu, Iwate: Kuriyagawa").

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Correspondences should be addressed to: Prof. em Dr Ahmet Ömer Koçak, c/o Yüzüncü Yıl University, Fen Fakültesi, Biyoloji Bölümü, Kampus, Van / Turkey. - e-mail: cesa_tr@yahoo.com.tr

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